Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	**)**	
	)	
Carrier Current Systems, Including Broadband over Power Line Systems	**)**	**ET Docket 03-104**
	)	
	)	
Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems	**)**	**ET Docket 04-37**

Reply Comments of Scott D. Prather and Anne H. Prather

Introduction

In response to the Federal Communication Commission's Notice of Proposed Rulemaking regarding Access Broadband over Power Line Systems (ET Docket #04-37), Scott D. Prather, licensee of amateur radio station N7NB and Anne H. Prather, licensee of amateur radio station KA9EHV, wish to provide the following reply comments for consideration by the Commission.

Discussion

Industry Attempts to Attain Quasi-Licensed Status

As we read through the NPRM comments filed by BPL proponents, we became increasingly concerned that the industry, through it's reluctance to endorse some of the key proposals in the Commission's NPRM, is attempting to elevate Access BPL to quasi-licensed status. The three subsections that follow specifically address this aspect of BPL operation and our responses to industry comments:

a) BPL Industry's Request to Eliminate the Proposed Shutdown Requirements of §15.109(f)

Our first concern was raised in response to what appears to be an industry effort to selectively implement the device shutdown requirements of proposed §15.109 (f). This proposed part is based on §15.5(c), and it simply reiterates the very essence of operating an unlicensed device under Part 15. Simply put, any Part 15 intentional, unintentional, or incidental radiator must cease operation in the event that it causes harmful interference that cannot be eliminated by any other means.

BPL proponents appear to be quite concerned about this very basic rule. As an example, Ameren Energy (AEC)[1] provided these comments concerning the Commission's proposed requirement for a shut-down feature:

> *"AEC disagrees that Access BPL devices should incorporate a shut-down feature that would deactivate units "found" to cause harmful interference, as proposed in new §15.109(f). Instead, AEC believes that the new adaptive interference mitigation feature, which includes power reduction and change of frequencies, should be sufficient protection. Going beyond that to a shut-down feature that would terminate service to a broadband subscriber without warning is not warranted by the actual field experience of existing experimental systems. This additional feature would add cost and complexity that is not necessary."*

Similar comments were provided by Current Technologies, LLC, a BPL equipment provider[2]:

> *"To avoid substituting regulatory fiat for the forces of the marketplace, the Commission should allow BPL providers a minimum period after the effective date of the rules of 36 months before they must purchase BPL devices that can be remotely configured or disabled. Devices purchased before that date should be grandfathered."*

We find these comments from AEC and Current Technologies to be extremely troubling. All licensed services that we are aware of have always had a stipulation requiring some method of positive control over the transmitter. While unlicensed Part 15 devices such as baby monitors, cordless phones, wireless LANs, etc., don't necessarily have a specific "shut-down" feature, it's typically simple enough to unplug the device or remove the batteries. However, unlike typical consumer Part 15 devices, BPL transmitters will be deployed by the thousands across the country, and by design they are typically accessible only to the utility. Consequently, the desire on the part of the industry to allow BPL devices to be deployed without any means of remotely disabling the transmitter contradicts the most basic aspect of the FCC rules for every radio service that we are familiar with, let alone the very essence of Part 15 as defined in §15.5 (c).

If the implementation of remote shutdown and/or power control functionality is as difficult as the industry claims, then perhaps the Commission should question whether Current Technologies, who strongly opposed this requirement, should be building Part 15 equipment to begin with, since controls of this type are already recommended or required in the existing rules (§15.15 and elsewhere) and they should not require a monumental advancement in technology. How could a manufacturer with the engineering skill to design and build Access BPL transceivers for national deployment be incapable of adding the few extra components and/or lines of code required to remotely control the transmitter in a cost-effective manner?

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1. Ameren Energy Communications, Inc. comments to ET Docket 03-104 and ET 04-37 dated 29 April, 2004, pages 8 and 9.
2. Current Technologies, LLC comments to ET Docket 03-104 and 04-37, dated 3 May, 2004, page 22

Through this request to eliminate the shut-down provision of proposed §15.109 (f), it appears to us that AEC and Current Technologies are essentially asking the Commission to create a new, quasi-licensed class of unlicensed radio transmission equipment that is elevated above all other Part 15 devices. If the shut-down requirement of proposed §15.109 (f) is eliminated and Access BPL causes harmful interference to a licensed service, the interfering BPL system would essentially attain *defacto* primary status on every frequency for which it causes harmful interference for an indeterminate period of time, since literally no one has the ability to shut the BPL transmitter down unless an authorized utility company worker climbs a pole or opens a pedestal to do so.

In response to AEC's comment "*... a shut-down feature that would terminate service to a broadband subscriber without warning is not warranted by the actual field experience...",* our first reaction to AEC is that if reliability of service to customers is paramount, why are they even considering Access BPL to begin with? As a service operating under Part 15, it is, by definition, unreliable, since it is not protected from interference and must shut down if it causes interference that cannot be resolved by any other means, as stipulated in §15.5 (c). The inherent unreliability of Part 15 seems to have been overlooked completely, and is indicative of an overall industry denial that service interruptions are a likely problem with Access BPL. And what field experience is AEC referring to? No evidence is provided to support their claim that a shut down feature is unwarranted.

We urge the Commission to retain proposed §15.109 (f) as written and make remote shut-down functionality mandatory on all BPL devices.

b) Desire to Control and Monitor the Electric Power Grid via BPL

In the NPRM comments, we noted that a number of BPL providers were considering the use of BPL for monitoring and control of the electrical power grid. For example, American Public Power Association (APPA)[3] provided these comments:

> *"Access BPL technology is not just viewed as a platform for providing broadband services, but will allow public power utilities to monitor and control their electric distribution systems."*

Consolidated Edison[4], made the following statement:

> *Con Edison also confirms the Commission's beliefs that because BPL systems may be utilized to control and monitor the electrical system, Access BPL systems will be "managed on a more controlled basis as compared to other typical Part 15 operations".*

3. American Public Power Association comments to ET Docket 03-104 and ET 04-37, page 9
4. Consolidated Edison Company of New York, Inc. comments to ET Docket 03-104 and ET 04-37, dated 3 May, 2004, page 5

In its comments to the Commission, Southern Linc[5] proposed the use of BPL to support:

1. Reclosure Operations
2. Power Quality Monitoring
3. Automated Meter Reading
4. Automatic Connect and Disconnect
5. System Security

While it may be true that BPL can support some if not all of these control functions, their criticality cannot be used as an excuse to allow a BPL device which is causing harmful interference to be exempt from prompt interference mitigation, even if it means shutting down the device or multiple devices.

The comments of APPA, Con Edison and Southern Linc all contain the same theme: A BPL system is somehow more controlled than other Part 15 devices and therefore the shutdown requirements that apply to other Part 15 devices shouldn't necessarily apply to them.

In addition, the industry claims that shutting down a BPL device or devices is an absolute last resort because, among other things, it would have the potential to affect the utility's ability to monitor their network. We are not advocating the use of a shut-down feature as the primary means of harmful interference mitigation from Access BPL. However, it appears to us that the BPL industry has essentially put the Commission on notice that there may be dire consequences if a BPL operator is required to shut down any portion of their BPL network due to harmful interference, and it appears that the industry may use power grid monitoring and "public safety" as a loophole to keep a BPL device in service even if it is proven to cause harmful interference to licensed users. This goes back to the point we made at the beginning of this section: The Access BPL industry is essentially trying to attain quasi-licensed status under Part 15.

Currently, many utilities employ Power Line Communications (PLC) in the 9-490 kHz band for telemetry, network monitoring, and network control under §15.113. We ask the Commission to consider how it can be that Access BPL is somehow more important to the operation and control of the power grid than the PLC that utilities already operate under §15.113. Moreover, we foresee the potential for utilities to intentionally occupy a portion of their BPL bandwidth with some form of power grid monitoring equipment, with the claim that it must be kept in operation in order to prevent the possibility of creating a public safety hazard, even if the same function could have been performed using PLC equipment or some other medium.

We urge the Commission to reject any attempts by the BPL industry to pick and choose what aspects of Part 15 that they wish to comply with and under what conditions, and that

5. Souther Linc, Southern Telecom, Inc. and Southern Company Services, Inc. comments to ET Docket 03-104 and ET 04-37, dated 3 May, 2004, pages 9 and 10

if network control and/or public safety is their primary concern, the industry should employ inherently reliable communications systems such as licensed microwave, fiber optics, etc.

We also recommend that the Commission include a section to the new rules for Access BPL which explicitly states that any Access BPL network element operating under Part 15 shall not be used for any purpose where the loss of any part of the network will result in a hazard to the public or the electrical power grid. We propose the following text:

> *§15.109 (h) Entities operating Access Broadband over Power Line systems shall not utilize Access Broadband over Power Lines as the primary method of controlling devices or systems within the electrical power grid that could pose a danger to the public, to utility workers, or the power grid itself in the event Access Broadband over Power Line devices fail or must be shut down to mitigate harmful interference in accordance with §15.109 (f) or §15.5(c) of this part.*

c) Grandfathering Of Existing Equipment

We were not at all surprised to see many BPL proponents requesting that the Commission allow "grandfathering" of existing BPL equipment, making it exempt from certain proposals in the NPRM, such as the requirements of proposed §15.109 (f). For example, the United Power Line Council[6] stated:

> *"The UPLC requests that the FCC grandfather existing equipment and provide Access BPL providers up to two years to bring new equipment into compliance with any mitigation requirements that the FCC should choose to adopt."*

Similarly, these comments were provided by Hawaiian Electric Co., Inc.[7].:

> *"HECO favors dynamic or remote controlled-basis control of power levels and/or frequencies, provided the Commission affords existing BPL equipment vendors and service providers sufficient time to come into compliance with any new rules the Commission adopts in this proceeding. HECO asserts, as Current Technologies states in its comments to the Notice, that "applying these measures to BPL devices would be intrusive and discriminatory." The present radio-frequency environment has numerous emission sources, many of them consumer in nature, and singling out BPL is discriminatory. From a practical nature as well, HECO is also concerned that onerous technology requirements will increase the costs of BPL equipment, when in essence, BPL components needs to continue decreasing in cost.*

We find it extremely difficult to believe that remote RF power level control or remote transmitter shut-down is difficult to implement or would result in an unacceptable increase in the cost of BPL devices. BPL is possible today because of recent advances in digital

6. UPLC comments to ET Docket 03-104 and 04-27, dated 3 May, 2004, page 13
7. Hawaiian Electric Co. Inc. comments to ET Docket 03-104 and 04-27, dated 3 May, 2004, page 3

signal processing that have made it relatively simple and inexpensive to generate OFDM or DSS signals. For the BPL industry to claim that it's not cost effective to add something as simple as variable RF power control or remote shut-down is beyond belief.

We understand that, in some cases, there may be development time required for some of the proposals in the NPRM. However, most of the interference mitigation measures proposed for BPL have been common knowledge for years. Again, we see the BPL industry making yet another attempt to elevate their service above all other Part 15 devices and make it a quasi-licensed service through their desire to deploy equipment (under a lengthy grandfathering provision) that will not meet the *basic* requirements of Part 15, even without the explicit requirements proposed for Access BPL.

Finally, we strongly dispute HECO's claim that applying interference mitigation requirements to Access BPL is "intrusive and discriminatory". Throughout this proceeding, we have been continually frustrated by the industry's inability to accept the fact that the physics of Access BPL make it unique. NTIA[8] summarized the unique interference aspects of Access BPL vs. cable television (as regulated under Part 76) this way:

> *"...Like Access BPL systems, cable television systems are unintentional radiators. Ideal cable systems radiate no emissions and imperfections result in signal leakage. In sharp contrast, ideal Access BPL systems radiate emissions, endemically, albeit unintentionally."*

Even though any interference generated by an Access BPL system is unintentional, the need to regulate its severity and mitigation is fully warranted due to the fact that, unlike cable modem or DSL, the Access BPL transmission line is both unshielded and unbalanced, and therefore has the potential to radiate at levels well above properly installed and maintained DSL or cable modem.

We urge the Commission to reject any requests from the industry to allow the deployment of Access BPL equipment that does not meet the requirements of §15.109 (f), and we further urge the Commission to reject any requests to grandfather Access BPL equipment that does not meet the requirements of §15.109 (f).

Logistics of Interference Mitigation

As we read through the BPL industry comments to the Commission's NPRM, we noted that while the industry acknowledged it was obligated to mitigate interference caused by Access BPL devices, the industry proposes a reporting process that would place a considerable burden of proof on the person or entity reporting harmful interference. It was clear from many of the comments that interference resolution could be an extremely time consuming process, if the BPL operator even chose to acknowledge that there may be a prob-

8. National Telecommunications and Information Administration, Comments to ET Docket 03-104 and ET 04-37, dated 4 June, 2004, Page 24, footnote 36

lem. At least one Access BPL equipment manufacturer recommended what would essentially be a Byzantine reporting process. For example, the comments of Current Technologies[9] included a proposed interference complaint process that reads as follows:

> *"(a) A spectrum user suspecting BPL interference lodges a complaint with the third party entity described above, possibly via an Internet website. The complaint must provide information reasonably necessary to identify the source, including date(s) and time(s) of interference, receiver location, frequency, receiver modulation, antenna type, gain, and azimuth, and a description of the interference.*
>
> *(b) Using the BPL database, and applying interference criteria developed for the purpose, the third-party entity makes an initial determination as to whether any BPL device in operation might plausibly cause the interference. If not, it so notifies the complainant. E.g., "The Access BPL emitter nearest to your location, operating on the frequency you identified, is 60 kilometers distant from your location and is unlikely to be the source of the interference you reported."*
>
> *(c) If one or more BPL emitters could be the source of the interference, the entity forwards the complaint to the appropriate BPL provider. In response, the provider may (i) contest the report, e.g., "Not us -- we turned off that frequency a month earlier"; or (ii) accept responsibility and undertake mitigation measures; or (iii) request assistance in determining whether its equipment is the cause of the interference.*
>
> *(d) With the cooperation of both the complainant and the BPL provider, the entity may coordinate experiments to help determine whether a suspected BPL device in fact is the cause of reported interference. Experiments might consist, for example, of momentarily turning off the BPL device to see if that interrupts the interference.*
>
> *(e) If the BPL provider accepts responsibility for the interference, or experiments show a BPL device is the likely cause, the BPL provider must promptly undertake mitigation measures. The entity follows up with the complainant to confirm that those measures correct the interference. If the complainant remains aggrieved after the entity concludes the interference has been corrected, the complainant can invoke existing complaint procedures at the Commission."*

9. Current Technologies, LLC comments to ET Docket 03-104 and ET 04-37, dated 3 May, 2004, pages 25 and 26

The process described by Current Technologies is decidedly lacking in a time element on the part of the BPL operator. As an example, we will apply the process proposed by Current Technologies based on the following assumptions:

1. A licensed station is receiving harmful interference that could be caused by Access BPL
2. A web site is available to "prescreen" complaints based on complainant's distance to nearest BPL deployment, operating frequency, etc., and the database confirms that an operational Access BPL system is in the vicinity of the complainant.
3. As a result of (1) and (2) above, the BPL operator has been contacted and acknowledges that there is a possibility that their Access BPL system could be a source of the harmful interference

We are left with the licensed operator at Step D. Here, the BPL operator has made it clear that they have the option to run tests with the complainant in order to determine whether their system is at fault. However, there is no indication that the BPL operator is under any obligation to perform these "experiments" in a timely manner. Only when we get to Step E does the BPL operator acknowledge that the harmful interference caused by their network must be dealt with promptly, and even then they offer no timeline nor any specific means for the licensed party and the BPL operator to work through the remainder of the mitigation process.

We also note that the industry has made a general assumption that Access BPL interference will always be limited in scope, and that interference complaints from licensed users beyond some arbitrary distance limit would be categorically defined as exempt from investigation. However, because Access BPL is operating in the HF radio spectrum, there is no reason to believe that interference will always be limited to the immediate vicinity of the BPL network. Ionospheric and other propagation modes that exist in the HF frequency range have the potential to cause harmful interference hundreds, if not thousands of miles away at very low power levels. The BPL industry is quick to point out that test deployments have resulted in few, if any, interference complaints. However, since BPL transmissions are not readily identifiable, it is highly probable that licensed stations have been receiving interference from Access BPL but had no idea what the interference was, let alone who they should contact. It is for this reason that we recommended that the Commission require all Access BPL systems to transmit some form of identification, preferably by Morse code at the extremes of each BPL transmitter's frequency of operation[10]. A precedent for an identification requirement which applies to unlicensed devices currently exists in §15.255 (i).

We urge the Commission to require BPL operators to expeditiously investigate harmful interference complaints. For example, there is no reason why an Access BPL operator could not run the tests described in Step D of Current Technologies' proposed interference mitigation process within 30 minutes of being contacted by the complainant. If an Access BPL device (or devices) is found to cause the harmful interference, the BPL operator

10.Scott D. Prather and Anne H. Prather comments on ET Docket 04-37, page 6

would have another 30 minutes within which to invoke a change in operating frequency, notching, lowering of output power, or shut-down in order to resolve the interference complaint.

Summary

Through these reply comments, we have attempted to outline the realities of BPL operation in the United States. We are especially concerned that the proponents of Access BPL are making recommendations that would elevate this technology to the status of a quasi-licensed, primary-use service in a unique portion of the radio spectrum. We realize that there is considerable interest in using Access BPL to support a third option for Internet access, and to provide service to rural areas. However, as we have maintained throughout this proceeding, Access BPL is not the simple "third wire" its proponents claim it to be. The physics of Access BPL make it unique, and compliance with Part 15 may be difficult for BPL operators to maintain. We urge the Commission to take steps to ensure consistent usability of this portion of the radio spectrum which has the unique capability of providing long-distance communication in cases of emergency. Primary users of the HF spectrum, including government, civilian and military entities must be able to maintain communications capability within the HF spectrum in order to take advantage of its unique capabilities should the need arise.

We urge the Commission to adopt rules that clarify the following points:

- Primary control of mission-critical control functions are beyond the purview of any unlicensed radio service which must cease operation if it causes interference and must also accept interference from licensed services. Therefore, the primary use of Access BPL for these vital control functions should be prohibited.

- BPL devices are subject to the same level of positive control required of transmitters in other services, including the ability to cease operation

- "Grandfathering" BPL equipment that does not comply with current or proposed FCC Part 15 rules shall not be allowed

Respectfully Submitted,

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